

Invasive Brain Stimulation for Epilepsy

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Invasive brain stimulation for epilepsy refers to a surgical option through electrical stimulation of the brain.

Various structures of the brain have been investigated as the target for stimulation, such as the thalamus, subthalamic nucleus, cerebellum, hippocampus and epileptic focus of cerebral cortex. Brain stimulation can be classified according to the targets and the stimulation modality:

[1] To stop seizure onset by direct stimulation of epileptogenic zone, e.g. focus in the eloquent area, mesial temporal. The stimulation modality can be open loop (continuous stimulation), or close loop (responsive stimulation).

[2] To stop seizure propagation by stimulation of certain key structure along the pathway to alter the epileptic network, such as deep brain stimulation (DBS) of the anterior nucleus of the thalamus (ANT).

DBS of the Anterior Thalamus Nucleus (ANT) and Responsive neurostimulation have been studied in large randomized trials in adult population.

In the responsive neurostimulation study with long term follow up (2011, 2015), the 50% seizure reduction responder rate was 44%, 53% and 58% at one, two and 3-6 years respectively.

In the ANT DBS study with long term follow up, (SANTE study, 2010, 2015), the 50% seizure reduction responder rate was 43%, 54% and 68 at one, two and five years respectively.

For ANT DBS, recent studies showed improved result by direct visualization of the target and stimulating the site where the mammillo-thalamic tract (MTT) joins the ANT.

Brain stimulation for epilepsy in paediatric population has been reported effective in small series.

In Hong Kong, three cases of ANT DBS have been done for refractory epilepsy since 2015 with encouraging results. Details will be presented.